

REMARKS

The last Office Action, which has been made final, in the above-identified application and the references cited by the Examiner have been carefully considered. The claims have been amended in a sincere effort to define more clearly and more specifically features of Applicants' invention which distinguish over the art of record.

Claims 1-6, 8-13 and 15-18 are pending in this application. They have again been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,602,423 (Jain) in view of U.S. Patent No. 5,923,088 (Shiue et al.).

In response, a Request for Continued Examination (RCE) is being filed concurrently herewith, and it is respectfully requested that this Reply to Final Office Action, and the amendments to the claims made herein, and arguments in support of the patentability of the claims, be entered and favorably considered. A Petition for a Two-Month Extension of Time is further being filed concurrently herewith.

In response to the prior Office Action mailed September 19, 2002, Claims 17 and 18 were added in a sincere effort to define the resistance of the pad trench in structural, as opposed to functional, terms. Some narrow limitations which are included in each of Claims 17 and 18 include the specific structure that each contact hole is positioned near at least one of the island protrusions, and that the further conductive film is formed below the plurality of protrusions.

In the last Office Action, and in particular, the Response to Arguments section, in the last paragraph on page 4 of that section, the Examiner contends that the Jain patent shows in Figure 13 thereof that via 58 is "near" one of a plurality of protrusions 50.

The courtesy of Examiner Lee in granting a telephonic interview in this case is acknowledged and gratefully appreciated. The telephonic interview with the undersigned attorney took place on September 26, 2003. During the interview, the Jain and Shiue et al. patents were discussed, along with Claims 17 and 18. Further discussed was the Examiner's contention that via 58 shown in Figure 13 of the Jain patent is "near" one of the plurality of protrusions 50.

Further during the interview, the undersigned attorney proposed some changes to Claims 17 and 18. More specifically, a new limitation which was proposed to be added to Claims 17 and 18 is that at least some of the contact holes are situated between adjacent insulating protrusions. The purpose was to add more definitive structural language to Claims 17 and 18 to overcome the Examiner's contention that functional language does not structurally differentiate the Jain and Shiue et al. patents from the claimed invention.

The Examiner's attention to Figures 10-13 of the subject application is respectfully requested. The damascene interconnection and semiconductor device respectively defined by Claims 17 and 18, as amended, are illustrated by Figures 10-13. In each figure, there are shown a plurality of contact holes 26 which interconnect the conductive film 22 with the further conductive film 30 situated below a plurality of insulating protrusions 20.

To clarify the language "near" which was included in original Claims 17 and 18, the claims have now been amended to include the further limitation that at least some of the contact holes are situated between adjacent insulating protrusions. This structural limitation is clearly shown in Figures 10-13, where contact holes 26 are shown between protrusions 20. Again, the purpose of adding such limitations is to clearly distinguish the structure of the damascene interconnection and semiconductor device respectively defined by Claims 17 and 18 over the art of record, including the Jain and Shiue et al. patents, and to add structural limitations to the claims which satisfy the Examiner's requirements. Claims 17 and 18 have also been placed in independent form and include the limitations of Claims 1 and 8, respectively, from which they had depended.

The Shiue et al. patent does not show a plurality of insulating protrusions. Furthermore, the electrical resistance of the three metal layers of the bond pad structure, or the effects thereon by any structure even remotely comparable to an insulating protrusion in the bond pad structure, is not disclosed or discussed in the Shiue et al. patent. This, it is believed from the interview and last Office Action, the Examiner agrees with. Furthermore, the Jain patent does not show in Figure 13 or disclose anywhere else in the patent 1) a plurality of contact holes, 2) at least some of the contact holes being situated between adjacent insulating protrusions, 3) each contact hole of the plurality of contact holes being positioned near at least one protrusion, and 4) the further conductive film is formed below the insulating film and the plurality of protrusions.

During the interview with Examiner Lee, the proposed structural limitation for Claims 17 and 18 was discussed. Examiner Lee agreed that the only one via 58 which is shown in Figure 13 of the Jain patent is not "situated between adjacent insulating protrusions". Examiner Lee suggested that the undersigned attorney add this limitation to Claims 17 and 18 and resubmit it for formal consideration with a Request for Continued Examination.

It is respectfully urged that the Jain patent and the Shiue et al. patent, alone or in combination, do not disclose the features set forth in amended Claims 17 and 18. The one via 58 which is shown in the Jain patent is not situated between adjacent insulating protrusions. Also, the Jain patent only shows one via 58 and not a plurality of contact holes, where each contact hole of the plurality of contact holes is positioned near at least one insulating protrusion of the plurality of insulating protrusions. Additionally, it is respectfully submitted that neither the Jain patent nor the Shiue et al. patent, taken alone or in combination, shows what would be comparable to the further conductive film 30 situated below the insulating film 14 and the plurality of protrusions.

Accordingly, it is respectfully urged that Claims 17 and 18, as now more specifically amended, patentably distinguish over the references of record and are allowable.

With respect to independent Claims 1 and 8, the damascene interconnection and the semiconductor device, respectively defined by Claims 1 and 8, include a further conductive film buried in the interconnection trench and the pad trench which is connected electrically to the first conductive film through the contact hole such that the second conductive film substantially suppresses an increase in electrical resistance in the pad trench due to the formation of the protrusion. The Examiner, in paragraph 3 on page 3 of the last Office Action, agrees that Jain and Shiue et al. never considered the increased resistivity of a pillared landing pad. As such, it is respectfully urged that the structures disclosed in each of the Jain and Shiue et al. patents were provided for different purposes and are, essentially, non-analogous to one another. There is no teaching in the Shiue et al. patent to disassemble the bond pad structure having metal layers and via plugs which were only provided to increase the tensile strength and sheer strength thereof, and putting one of those metal layers underneath the plurality of insulating pillars in the Jain damascene semiconductor device in order to counter the effects of increased resistance in the landing pad caused by the pillars. The Shiue et al. patent does not even disclose a damascene interconnection. Jain never thought about including a lower conducting film interconnected by vias to an upper

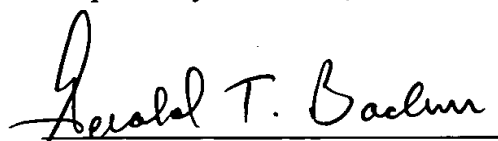
conducting film of his landing pad to counter the effect that his pillars might have in increasing the electrical resistance of his landing pad 55. Jain did not teach the combination of the two structures, and certainly Shiue et al. did not teach the combination of the two structures. Only Applicants realized the resistance problem and corrected it by the structure of their damascene interconnection and semiconductor device set forth in Claims 1 and 8, respectively. The Shiue et al. patent is non-analogous art to the Jain patent, and there is no motivation or suggestion in either the Shiue et al. or Jain patent to combine the references to provide the structure set forth in Applicants' Claims 1 and 8. It is only in a hindsight reconstruction of the invention, through the teachings of Applicants' disclosure, that these two references are being combined. As such, it is respectfully urged that Claims 1 and 8 patentably distinguish over the references of record and are allowable.

Claims 2-6, 9-13, 15 and 16 depend directly or indirectly from independent Claims 1 and 8. As such, they are respectfully urged to patentably distinguish over the references of record for the same reasons submitted with respect to Claims 1 and 8.

Claim 3 has been amended for clarity purposes to correct a minor grammatical error.

In view of the foregoing amendments and remarks, favorable consideration of amended Claims 17 and 18, now in independent form, and amended Claim 3, favorable reconsideration of independent Claims 1 and 8 and dependent Claims 2, 4-6, 9-13, 15 and 16, and allowance of the application with Claims 1-6, 8-13 and 15-18 are respectfully solicited. If the Examiner has any suggestions or comments which would be helpful to advance this application to a favorable conclusion, such would be appreciated by the undersigned attorney, and the undersigned attorney may be reached at the telephone number given below.

Respectfully submitted,



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